LETTERS TO THE EDITOR.

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Scope of the Royal Society.

As a general principle it is not desirable to make the affairs of the Royal Society a subject of public discussion. The question to be submitted to the consideration of the fellows on May 9 is, however, of sufficient general interest to justify an exception.

The notice given has been short, and I am unable to be present. No vote is to be taken. It will, therefore, not be too late to draw attention to some facts which appear to me to have been overlooked.

The starting point of the matter as it is presented to the Society is contained in the following statement :—

"The Society exists for the promotion of Natural Knowledge. The interpretation of the term 'Natural Knowledge,' according to the present practice of the Royal Society, assigns to it a range from Mathematics to the various Biological sciences, and this secures the inclusion of the scientific study of man in his biological relations. It has been argued that this range might be properly increased by the inclusion of the scientific study of man in his reasoning, social and historical relations. It may, indeed, be further contended that the Society should include in its scope all branches of Natural Knowledge which are capable of consecutive and ordered development. Such a test would permit the inclusion of subjects such as Psychology, Economics, Historical Science and Philology in the widest sense of the term, which, under the present practice of the Society, may be deemed excluded, but which, when pursued as they now are by the most capable students, in a scientific spirit and by scientific methods, do fall within the domain of Natural Knowledge. The investigation, for instance, of the phenomena of the origin and variations of human speech, of the beliefs and customs of primitive man, of the production and distribution of wealth, of the laws which govern the development of political societies, is an investigation into natural phenomena in a sense which the progress made in our conceptions of nature during the last two centuries seems to justify."

Now I have always understood—and my impression is confirmed by the highest authority—that admission to the Society is actually open to any one who has promoted Natural Knowledge, in whatever field, by scientific methods. The open door may not have been taken advantage of, but I am not aware that there is the smallest ground for believing that it has ever been closed. What I wish to draw attention to is that though the actual representation of the subjects enumerated above may not have been as full as it might have been, I am unable to agree that they, "under the present practice of the Society, may be deemed excluded." A rather cursory inspection of the names of those who have been fellows, or have been elected during the last twenty years, confirms my opinion. Under Economics I find Heywood, Newmarch, Sir James Caird, Jevons, Palgrave, Sir Robert Giffen, Charles Booth and Shaw-Lefevre. I am under the impression that for the period this is a very fair, if not actually adequate, representation of economic science. Historical Science, I presume, must be taken to include archæology and ethnography, otherwise these will have again to be "deemed excluded." Assuming that this is not so, I find the names of General Pitt-Rivers, Sir Augustus Franks, Canon Greenwell, Tylor, Penrose and, in the list now recommended by the Council, of Arthur Evans. Of Historians, in a restricted sense, I find Dean Stanley and Sir Henry Howorth, and, if Privy Councillors are included, of Bryce and John Morley. And with regard to the class of Privy Councillors, it is to be remarked that although any one is eligible it is apparently rare for any to be elected without something more than mere political qualifications. Philology has been more weakly represented ; still, I find the names of the Dean of Canterbury, Alexander Ellis, Sir Henry Rawlinson and Bryan Hodgson. And if Psychology finds its only representative at the moment in Lloyd Morgan, it is, I believe, an open secret that Herbert Spencer might, had he thought fit, have been a fellow of the Society.

Besides the names I have enumerated, I am very much disposed to doubt if a score can be enumerated, or perhaps even half that number, of others in the same fields who during the last twenty years possessed conspicuous claims to admission to the Society. Nor can I believe that if men like the late Bishops of Oxford and London or Freeman had been willing to become candidates there would have been any likelihood of their being unsuccessful. Like Thorold Rogers, whom I often urged to allow himself to be proposed, they may not have desired admission.

W. T. THISELTON-DYER.

Kew, May 6.

The Spectra of Carbon Monoxide and Silicon Compounds.

A PAPER published by Prof. Hartley (*Proc.* Roy. Soc. vol. lxviii. pp. 109-112, March, 1901) reminds me of some observations on the spectra of the compounds of silicon with fluorine and hydrogen ($SiFl_4$ and SiH_4), made by me several years ago and published in *Wiedemann's Annalen* (vol. xxi. pp. 427-437, 1884). As they seem to be not without some interest, and a definite explanation of them has, so far as I know, not been given till now, I may be permitted to give here a short account of the principal contents of my little paper.

A vacuum tube filled with $SiFl_4$ and procured from Geissler Nachfolger, in Bonn, showed a spectrum of which the greatest part consisted in the well-developed band spectrum due to carbonic oxide, besides which there appeared the eight beautiful blue lines, or rather stripes, that seemed (at least then) to be characteristic of $SiFl_4$. Now there is nothing wonderful about the presence of traces of the carbonic oxide spectrum in a vacuum tube, as is well known, but in our case it was so predominant, as if one had not simply to deal with impurities, but on the contrary, as if it was the principal part of the phenomenon. Intending to clear up the circumstances, I tried to prepare vacuum tubes from which the presence of carbonaceous matter, as well as of air and moisture, were as much as possible excluded, and finally the $SiFl_4$ gas was developed from a mixture of pure glass and flourspar powder and also purest sulphuric acid in an apparatus composed entirely of glass and sealed directly to a Toepler mercurial pump. All stop cocks and sliding pieces that want greasing were totally avoided. Nevertheless, the carbonic oxide spectrum remained in its very predominant position ; at low pressures it was even present almost alone, as if one were working on a carbonic oxide tube containing some impurities due to silicon combinations. Sometimes, it is true, the carbonic oxide bands were less brilliant, and the blue stripes (belonging to $SiFl_4$?) more prevailing, from what cause I do not know, but still the carbonic oxide spectrum always remained well visible. Perhaps it is worth mentioning that sometimes there were seen four additional lines situated more towards the violet end of the spectrum, and occasionally, also, some green ones. Also the well-known swan spectrum could be obtained, especially when the discharges of a Leyden jar were sent through the vacuum tube. Even tubes illuminated in the well-known manner without the use of electrodes still showed the carbonic oxide spectrum in its predominant position. If some traces of oxygen had been developed from moisture, which, as is well known, it is almost impossible to totally remove from the glass apparatus used, and this had, by combining with some carbonaceous compound present in the tube given rise to some traces of carbonic oxide, then one could, so far as I know, only have expected a rather faint spectrum due to it. I do not know if the suggestion of carbon being contained in the element silicon is at all acceptable, according to present knowledge, but at all events the brilliant appearance of the CO bands awaits, as I believe, a sufficient explanation.

In a rather high vacuum this CO spectrum is not seen, but there are visible (except lines due to mercury, hydrogen, &c.) some lines also observable in highly exhausted tubes filled with carbonaceous compounds, but which, as I found in the latter case, only appear when luminous points are seen at the electrodes and the glass covers that partially surround them. As I found those lines to coincide with lines observed in the spark spectrum of $SiFl_4$ at high pressures, this so-called vacuum spectrum probably belongs to some silicious matter evolved out of the above-mentioned glass covers by the action of the said bright points.

Under suitable conditions SiH_4 also showed the carbonic oxide and swan spectrum, and as well the one ascribed to hydrogen, this latter especially being seen at lower pressures, whilst of a silicon spectrum nothing was observable. Only at higher pressures, by the aid of spark discharges, some of the lines were obtained that had been seen formerly in the spark spectrum of $SiFl_4$.

As my principal object in these researches had only been to get rid of the carbon spectrum (though in vain), I did not make any measurements of wave-length. Later on, as many laboratories were provided with powerful spectroscopic apparatus, I did not believe it to be any longer worth while to work on the subject with small instruments, hoping some other investigator would take care of it. I should be very glad if the present note would induce some spectroscopist to control and further pursue my observations. In addition, some researches with very strong sparks seem to me to be very desirable.

Berlin. KARL V. WESENDONK.

The Dust of "Blood-Rain."

I HAVE handed to Prof. Judd the specimens of "blood-rain" dust collected by me in Sicily, as mentioned in your issue of March 28. It may be remembered that the dust was collected from three tables on the terrace of the hotel, and that I brought home that from the most favourably situated table in the wet state in which it was obtained. This has since been dried and weighed, with the result that, as I expected, the density of the fall was greatest on this table, being equivalent to 9¼ tons per square mile. The average given by the other two tables was 5¼ tons per square mile.

The largest value is probably the best, but if we take the mean we shall be within the mark in saying that the density of the fall near the theatre at Taormina was about 7 tons to the square mile. ARTHUR W. RÜCKER.

A Convenient Primary Cell.

IN your "Notes" of April 18 (p. 594) you give an account of the new cell—the Cupron-element—brought out by the Accumulator Industries Company. Without intending any disparagement, will you allow me to point out that the cell, with the exception of the special form of copper oxide for which the company justly claim credit, was invented long ago by Lalande, but does not appear to be known so widely as its merits deserve. I have used the cell for a considerable time, the positive plate taking the form of a plate of copper faced on one side with granular copper oxide held in its place by a piece of copper gauze, and can corroborate the statements as to its very low resistance and great constancy. For elementary work, where resistances of a few hundredths of an ohm are to be compared and a galvanometer of negligible resistance used, I have found it most valuable. Another form of the cell, in which the copper plate is merely painted with a mixture of copper oxide powder and gum and then heated until the latter chars, is very readily set up, but has a rather greater internal resistance. Where this is desirable it may be regulated within considerable limits by making the cell a "sawdust Lalande," which has obvious advantages on other grounds. A. E. MUNBY.

Felsted.

THROUGH the kindness of the Editor I am able to reply to Mr. Munby's interesting letter. I did not intend by my note to imply that the "Cupron-element" was an entirely new combination, and indeed suggested that its chief claim to novelty lay in the construction of the copper oxide plate. The Accumulator Industries, Ltd., it is only fair to say, fully acknowledge in their circular that the cell is developed from the copper oxide element of Lalande and Chaperon. It is interesting to have Mr. Munby's testimony to the convenience of the cell, which is, I believe, used to a considerable extent on the Continent, but, as your correspondent says, is not very widely known in England.

THE WRITER OF THE NOTE.

AGRICULTURAL SEEDS.

UNDER the auspices of the Board of Agriculture a committee was appointed last summer to take into consideration the conditions under which agricultural seeds are at present sold, and to report whether any further measures can, with advantage, be taken to secure the maintenance of adequate standards of purity and germinating power.

The committee met on ten occasions and examined upwards of thirty witnesses, seed-merchants, farmers and scientific witnesses, including Mr. Carruthers, Mr. Gilchrist, Mr. Hall, Profs. T. Johnson, McAlpine and Somerville. The evidence of these witnesses is now published as a Blue-book, whilst the report of the committee is issued separately.

Taking the report first, the committee find that there is [now] no wide-spread complaint of the quality of seeds sold throughout the country. The committee, further, think that every encouragement should be given to seed-merchants to give a guarantee with the seeds they sell, and that farmers should be advised to buy only subject to such guarantee and to test the seeds they have purchased. To facilitate this the committee recommend the establishment of one central seed-testing station under Government auspices, with the aid and counsel of a small committee of experts. The report is signed by all the members of the committee. Two of their number, Sir W. T. Thiselton-Dyer and Mr. Leonard G. Sutton, while agreeing generally with the findings of the committee, raise objections to the proposal to establish a Government seed-testing station.

It is satisfactory to hear that the general quality of the seeds sold has greatly improved of late years. This improvement is, no doubt, in great measure due to the passing of the Adulteration of Seeds Act, an Act, it may be pointed out, which was promoted by the seedsmen themselves, who desired to purify their business from seed-killing, seed-dyeing and other questionable practices which had been allowed to grow up to such an extent that it was difficult for a merchant to avoid conniving at, if not practising them.

At present, so far as the large firms are concerned, there is in general no question as to the excellence of the seeds they sell, and those who, like the writer of the present notice, have had the opportunity of witnessing the care taken in selecting the seed and in afterwards cleaning it and preparing it for market will corroborate this statement. With the smaller dealers, especially in some parts of Wales and Ireland, the case seems different. There the farmers often buy relatively small quantities of seeds of low quality and equally low price from local tradesmen, ironmongers, cornfactors and the like, who have no other knowledge of seeds than such as is necessary for securing the best means of disposing of them. It is especially for the protection of small, and often ignorant, farmers that the seed-testing station is intended.

All the large firms test their own seeds and the seeds they buy from the Continent or elsewhere. Moreover, they grow them in their own trial grounds. They do this on a very much larger scale than would be possible in a seed-testing station.

Some of the smaller firms, and perhaps some of the large houses also, occasionally make use of the seed-control stations at Zurich or Halle, and they find it a grievance that they have to send to Switzerland or Germany for information which obviously could as well be obtained here. Indeed, the botanists of the Royal Agricultural Society (Mr. Carruthers) and of the Highland and Agricultural Society of Scotland (Mr. McAlpine), and perhaps others, do undertake to test seeds for the members of their several societies, or, under certain conditions, for outsiders.

These tests, wherever they be made, have reference to the "purity" of the seed, its germinating power and its "genuineness." By purity is meant freedom from seeds of weeds or other admixtures. The germinating power is tested by the percentage of seeds in any given sample which, under favourable conditions, is found to produce healthy seedlings. Theoretically a hundred per cent. should grow. In practice the percentage may, without fault of the seedsman, be, in certain cases, much below this, but it is satisfactory indeed when one thinks of the many contingencies to which the clover plant is subjected to find it to be quite common for 98 per cent. of the seed to grow. When one thinks of the humble bees, and the